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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/568,614	08/23/2006	Atsushi Koizumi	286272US0PCT	9363

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ALEXANDRIA, VA 22314

EXAMINER

KATAKAM, SUDHAKAR

ART UNIT	PAPER NUMBER
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1621

NOTIFICATION DATE	DELIVERY MODE
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07/20/2007

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No. 10/568,614	Applicant(s) KOIZUMI ET AL.	
	Examiner Sudhakar Katakam	Art Unit 1621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 May 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of the Application

1. Receipt of Applicant's Remarks and Arguments filed on 9th May 2007 is acknowledged. However, the arguments for the 103(a) rejection are not found persuasive and as such, the previous rejection for the claims 1-5 has been maintained for the reasons of record in the office action dated 10th January 2007. In view of addition of new claims the following rejection has been issued.

Claim 1 is amended and claims 6-8 have been added. claims 1-8 are rejected.

Response to Arguments

2. Applicant's arguments filed on 9th May 2007 have been fully considered but they are not persuasive.

The objective of the applicants' arguments is that neither **Okumura et al** nor **Smith**, alone or in combination, teaches or suggests a method of producing a tertiary alcohol using a low level of isobutylene in the C₄ hydrocarbon mixture.

The examiner does not find these arguments persuasive. The examiner knew that the **Okumura et al** did not disclose the applicants' claimed low level percentage of isobutylene in the mixture for the preparation of tertiary alcohol. However, **Okumura et al** clearly suggest a method in which, isobutylene in a C₄ hydrocarbon mixture with n-butenes and butanes is selectively hydrated to tertiary butyl alcohol [col. 4, lines 16-22]. The preparation of tertiary butyl alcohol from a mixture containing isobutylene and water in presence of a catalyst is known in the art. Please note the reaction is specific to isobutylene in the mixture and it is independent of the content of isobutylene in the

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mixture. Therefore, one would have been motivated to do this because **Okumura et al** teach a method in which, isobutylene in a C₄ hydrocarbon mixture with n-butenes and butanes is selectively hydrated to tertiary butyl alcohol.

Examiner agreed that **Smith** reference neither teaches nor suggests using a C₄ hydrocarbon mixture containing a low level of isobutylene. The purpose of the **Smith** reference is to compensate the deficiencies of **Okumura et al**, i.e., **Smith** teaches a method and apparatus for conducting a catalytic distillation process for the production of tertiary butyl alcohol from hydration of isobutylene in presence of acid cation exchange resin [col. 4 and lines 27-34]. Hence the combination of **Okumura et al** and **Smith** teachings read on the instant claims.

With regard to the new claims 6-8, **Matsuzawa et al** teach use of aliphatic carboxylic acids, such as acetic acid, in the process of making tertiary butyl alcohols from isobutylene and water [col. 8 and lines 50-61].

So, in view of the above explicit teachings of the references, the examiner finds that it would have been prima facie obvious to a person of ordinary skill in the art at the time the invention was made, to combine the teachings of **Okumura et al**, **Smith** and **Matsuzawa et al** to arrive at applicants process, with reasonable expectation of success of making the tertiary butyl alcohol.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious

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at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. Claims 1 and 6-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Okumura et al** (US 4,270,011) in view of **Matsuzawa et al** (US 4,011,272) and **Smith** (US 5,204,064) for the reasons of record.

Instant claims are drawn to a method for producing a tertiary butyl alcohol by reacting a mixture of C₄ hydrocarbons in which the concentration of isobutylene is 5 to 15% by mass and water in the presence of cation-exchange resin catalyst and at least one solvent from the group consists of sulfones and organic carboxylic acids by using catalytic distillation apparatus. Claims are further limited to a solvent, viz., organic carboxylic acid.

Okumura et al teaches a method in which, isobutylene in a C₄ hydrocarbon mixture, containing 40% of isobutylene, 40% of n-butene and 20% of butane, is selectively hydrated to tertiary butyl alcohol by carrying out the reaction with water at a temperature not above 100°C in the presence of a porous acid-type cation exchange resin and a sulfone [col. 2, lines 5-14].

The difference between the instant claims and **Okumura et al** is that in the instant claims the amount of isobutylene present in the mixture is 5-15% by mass, whereas in **Okumura et al** the mixture contains 40% of isobutylene. Another difference is that **Okumura et al** fails to teach organic carboxylic acid as a solvent and the use of catalytic distillation apparatus in the preparation of tertiary butyl alcohols.

The preparation of tertiary butyl alcohol from the mixture contains isobutylene and water in presence of a catalyst is known in the art. Please note that the reaction is specific to isobutylene in the mixture and it is independent of the content of the isobutylene in the mixture. Therefore, one would have been motivated to develop a more economical process to make tertiary butyl alcohol because **Okumura et al** teach a method in which isobutylene in a C₄ hydrocarbon mixture with n-butenes and butanes is selectively hydrated to tertiary butyl alcohol.

With regard to the solvent organic carboxylic acid for the process, **Matsuzawa et al** teach the use of aliphatic carboxylic acids, such as acetic acid, in the presence of making tertiary butyl alcohols from isobutylene and water [col. 8, lines 50-61].

With regard to the catalytic distillation apparatus, Smith teaches a method and apparatus for conducting a catalytic distillation process for the production of tertiary butyl alcohol from hydration of isobutylene in presence of acid cation exchange resin [col. 4, lines 27-34].

In view of explicit teachings of **Okumura et al**, **Matsuzawa et al** and **Smith**, the examiner asserts that it would have been obvious to a person of ordinary skill in the art, at the time of invention was made, to have modified the reference teachings, such as a

mixture containing isobutylene, carboxylic acid solvent with combination of catalytic distillation apparatus in the production of tertiary butyl alcohol, with reasonable expectation of success.

Modifying such methodology is prima facie obvious because an ordinary artisan would be motivated to use known processes to make the product more efficient or explore more economical advantages over the other, since it is within the scope to optimize the conditions through routine experimentation.

6. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

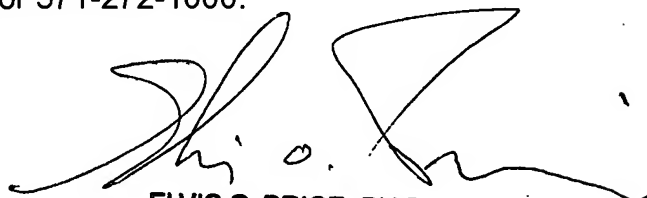
Correspondence

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sudhakar Katakam whose telephone number is 571-272-9929. The examiner can normally be reached on M-F 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yvonne Eyler can be reached on 571-272-0871. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

S. Katakam



ELVIS Q. PRICE, PH.D.
PRIMARY EXAMINER